Two Thousand Years of Lead Poisoning

- 1st Century AD. Dioscerides: Lead makes the mind give way
- 1763. Benjamin Franklin: Lead in painters, printers and tinkers
- 1830 Charles Dickens: Uncommercial Traveler
- 1892.Brisbane Australia: Childhood lead poisoning described
- 1943. Randolph Byers: Long term effects
- 1991. PHS Strategic Plan
- 1993: NAS Report

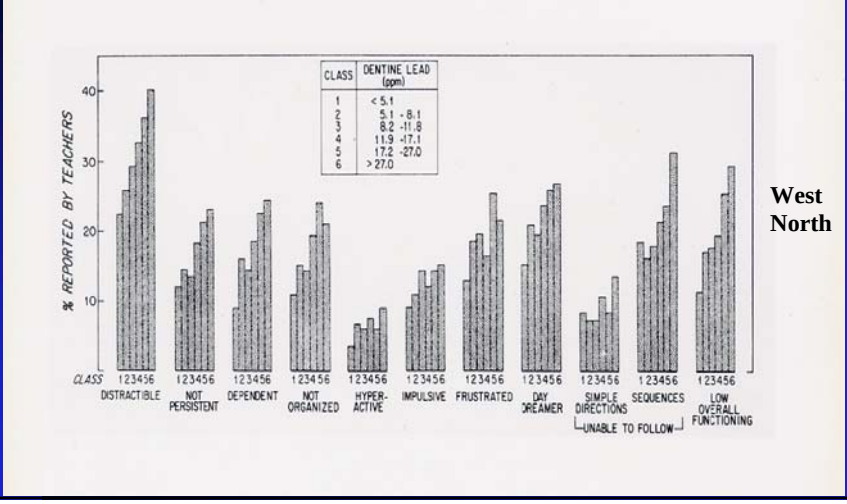
Five Phases of Lead Toxicology

1. There is no such thing as childhood lead poisoning. (1892)
2. If it doesn't kill you, it doesn't touch you
3. There are long term effects, but only in those with frank encephalpathy
4. Silent lead toxicity

Flaws in Early Studies

- Inadequate exposure markers
- Screening or group measures of outcome
- Inadequate control of confounders
- Potential selection bias

Classroom Performance Teacher's Ratings

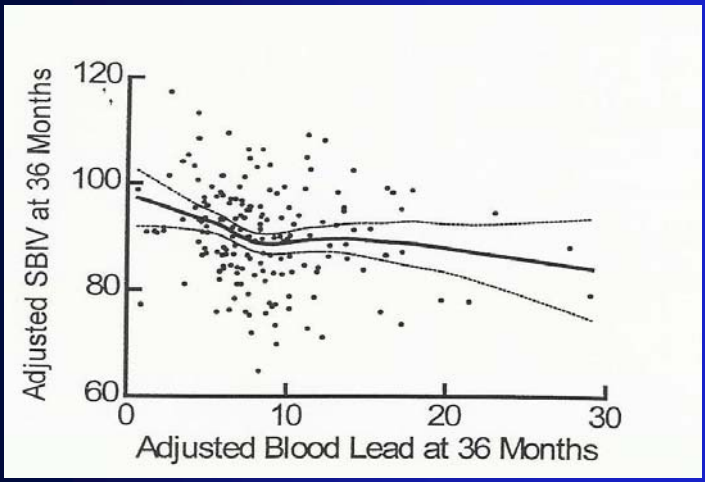


West North

Noncognitive effects

- Delinqency/social adjustment
- Attentional dysfunction
- Aging
- Cardiovascular effects/longevity

Slope of Lead/IQ Regression



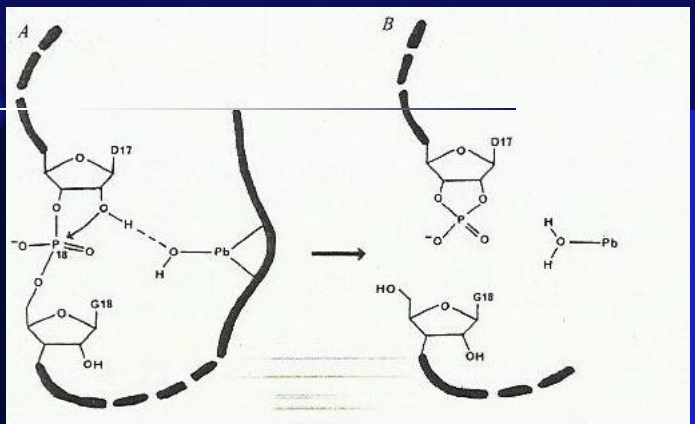


Fig. 2 Diagrammatic representation of the proposed mechanism for the sugar–phosphate backbone cleavage between residues D17 and G18 in monoclinic crystals of yeast $tRNA^{Phe}$. In *A* (before cleavage of the sugar–phosphate backbone) the Pb(II) moiety is depicted as being bound to, and positioned by, the $tRNA^{Phe}$ molecule, while in *B* (after strand cleavage) the Pb(II) moiety is depicted as being free of the $tRNA^{Phe}$ molecule.

Newer Studies

- **Lanphear et al.** Cognitive deficits associated with blood lead concentrations <10 microg/dL in US children and adolescents.Public Health Rep. 2000
- **Canfield et al** Intellectual impairment in children with blood lead concentrations below 10 microg per deciliter.NEJM 2003
- **Bellinger and Needleman** Intellectual impairment and blood lead levels NEJM 2003

Sales of Leaded Gasoline and Murder Rates

Case-Control Study

195 adjudicated delinquents, 155 controls
Bone lead levels
- Cases 11ppm±32ppm
- Controls 1.5 ± 32ppm

10 variates controlled in the analysis
Odds ratio **4.0 (1.4-11.1)**
Population attributable risk: **11%-38%**

Lessons Learned

- Require large samples: multicenter studies
- Multiple measures of exposure from birth onward of multiple toxins. Interaction effects
- Sensitive outcome measures: scheduled operative behavior, teachers' ratings, IQ
- Longterm follow up 40-50 years